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Title:	iHiFi Project/Task LANL Lower S-Band Power Amp Baseline ICD Data
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iHiFi Project/Task
LANL Lower S-Band Power Amp
Baseline ICD Data

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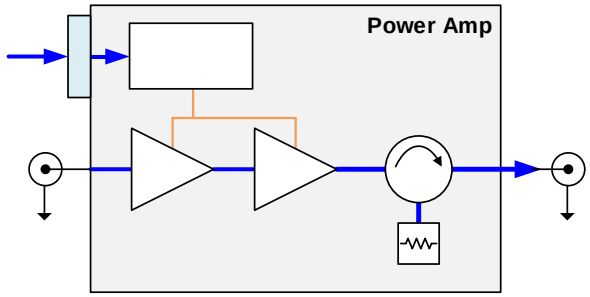
iHiFi: S-Band Power Amp

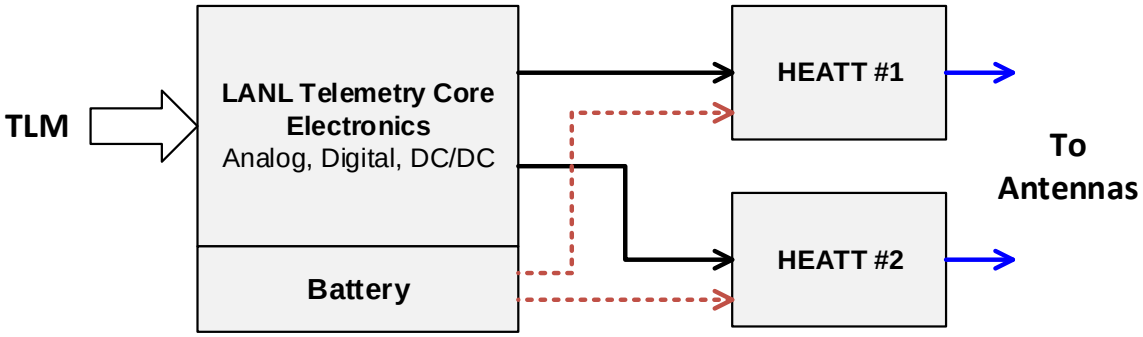
- **Baseline Design Path – "External" Power Amplifier Subsystem**
  - Electrical Description
    - Stand-alone hybrid power amplifier
      - OEM/COTS solution
      - 15W goal, +28V, >30% Eff., >+40dB gain
        - Ruggedized Mil/Aero
        - Screen/test as needed
  - Mechanical Description
    - Physical "double" for the SNL HEATT
      - Obvious volume and mass reduction representative of reduced electrical function
      - Connector interfaces:
        - SMA RF input/output
        - Multi-pin power and control connector



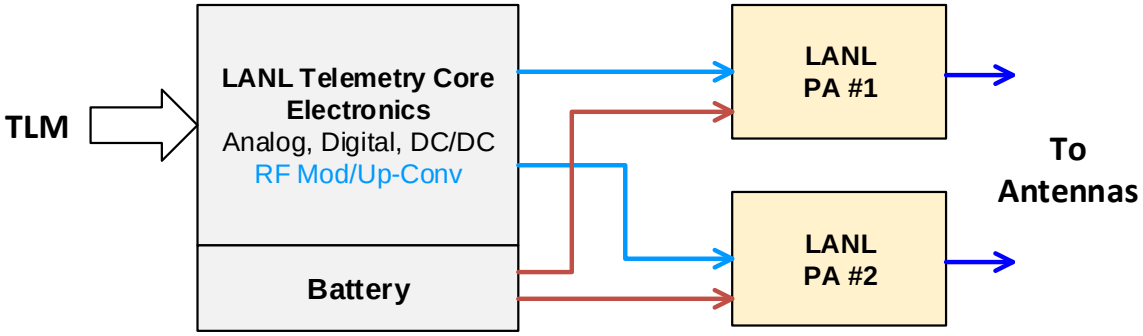
iHiFi: S-Band Telemetry Transmitter

Preliminary

- **Functional Block Diagrams**
  - LANL Telemetry System + Dual SNL HEATT Units



  - LANL Telemetry System + Dual Power Amps



Notes:
- *Not sure of the power path to the HEATT units*

iHiFi: S-Band Power Amp

- **Two COTS Solutions + HEATT Comparison**
  - Fair comparison would pit HEATT versus COTS PA + one-half of the iHiFi RF board

	NuPower	Emhiser	HEATT
Mass	< 3.7 oz	< 3.6 oz.	12 oz. +/-1
Height	0.65”	0.66	1.4”
Width	2”	2”	2.5”
Length	3”	2.5”	3.5”
Vol	3.9 in^3	3.3 in^3	12.25 in^3
RF Power	14.8 +/-1 Watt	< 12 Watt	13-17 Watt
DC Eff.	35% +8/-3	Approx. 32%	
+28V @	< 1.7A		1.8A
Technology	GaN	LDFET	GaN

iHiFi: S-Band Power Amp

- **Baseline Power Amplifier Unit - NuPower**
  - Mechanical Interface

2.2 NUPOWER 12B01A MECHANICAL SPECIFICATIONS

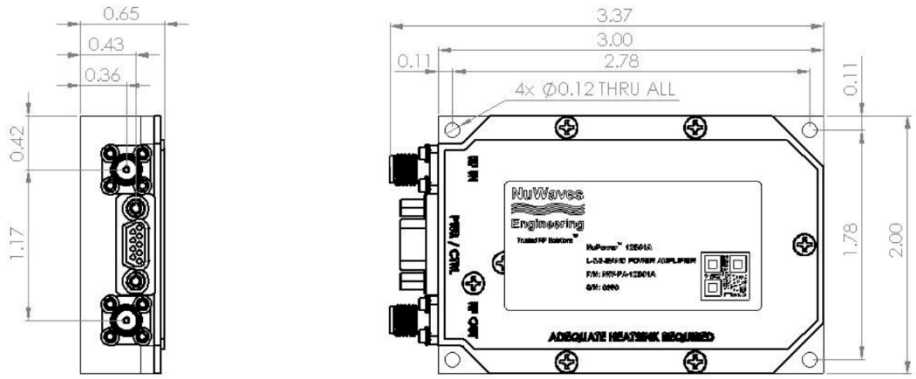


Figure 2: NuPower 12B01A Mechanical Outline

Table 4: NuPower 12B01A Mechanical Specifications

Parameter	Specification
RF Connectors	SMA (female)
Control / Power Interface Connector	9 Pin Micro-D (socket)
Dimensions (L x W x H)	3.00" x 2.00" x 0.65"
Weight	3.7 oz.

iHiFi: S-Band Power Amp

- **Baseline Power Amplifier Unit - NuPower**
  - Electrical Interface

4.1 INTERFACE CABLE HARNESS

The cable harness that connects the host controller to the 9 pin Micro-D connector of the NuPower 12B01A is made up of 9 wires.

Table 5: NuPower 12B01A Interface Pin-Out Definitions

Pin No.	Pin Name	I/0	Description
1, 2	V Supply	I	Primary Power (+28 VDC)
3, 4	GND	I	Signal and Power Ground
5	RF Enable	I	Transmit Control
6, 7, 9	N.C.	-	N/A
8	Temp Flag	0	Over-temp Indicator

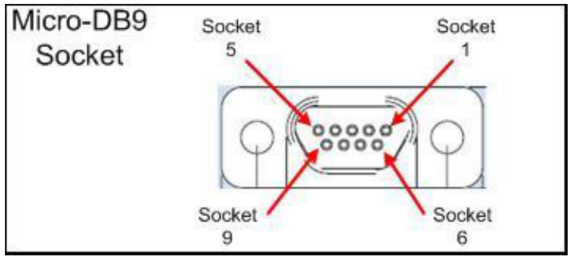


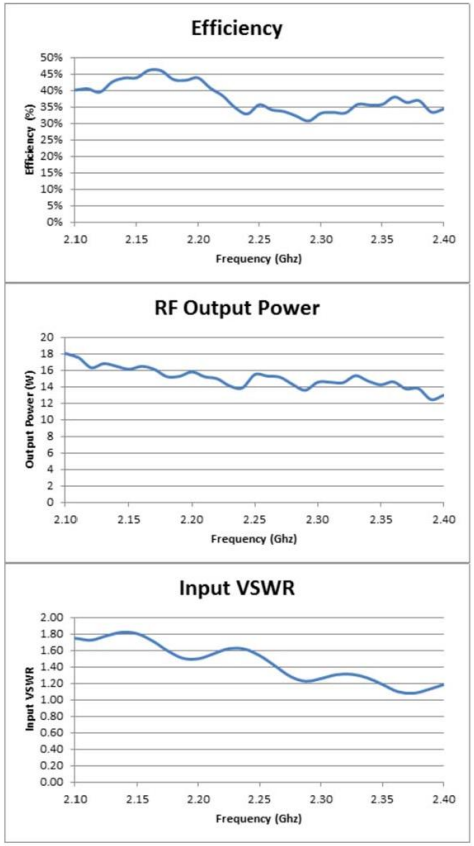
Figure 4: Micro-D Socket Locations

Parameter	Specification
Supply Voltage	+28 VDC +/- 2 VDC
Current Consumption	1.5 A @ +28 VDC (typ)
Power Amplifier Enable	GND On
Nominal Input Drive Level	0 dBm
Maximum Input Power (No damage)	+10 dBm
Impedance	50 Ω

Table 2: NuPower 12B01A Environmental Specifications

Operating Conditions	Specification
Operating Temperature for Continuous Operation (>5 minutes)	-30 to +55 °C (ambient) -30 to +60 °C (baseplate)
Operating Temperature for 20% Duty Cycle	-30 to +60 °C (ambient) -30 to +65 °C (baseplate)
Storage Temperature	-40 to +85 °C

iHiFi: S-Band Power Amp

- **Baseline Power Amplifier Unit - NuPower**
  - Electrical Performance
    - 

iHiFi: S-Band Power Amp

- **Baseline Power Amplifier Unit - NuPower**
  - Reliability
    - **Table 3: NuPower 12B01A Mean Time Between Failure (MTBF)**

Conditions	Hours
Ground Benign (GB)	126,690
Airborne Inhabited Cargo (AIC)	14,800
Airborne Inhabited Fighter (AIF)	10,650
Airborne Uninhabited Cargo (AUC)	8,400
Airborne Uninhabited Fighter (AUF)	5,800

Notes:
- *Full qualification testing only performed on the "First Article"*
- *MIL-HDBK-217F methodology*

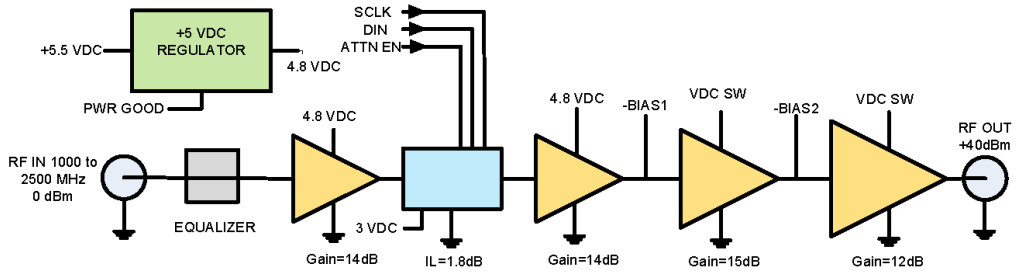


Figure 1: NuPower 12B01A Functional Diagram